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Item 10 (d) of the provisional agenda*

NATURAL DISASTER REDUCTION: INTERRELATIONSHIPS BETWEEN TECHNOLOGICAL AND NATURAL HAZARDS

Technical session

Programme

The session on interrelationships between technological and natural hazards is organized by the United Nations Environment Programme (UNEP).

Objectives. The session will highlight synergistic disasters (Na-Techs) where natural events such as earthquakes cause technological emergencies such as chemical spills, causing significant impacts on society and the environment. The session will aim to increase awareness of the causes, implications and possible solutions to managing such complicated disaster scenarios by drawing on experience from around the world.

Introduction (5 minutes)

Mr. Ye Ruqiu, Deputy Administrator of the National Environmental Protection Agency from the People's Republic of China, will make an introductory statement.

Speaker 1: Keynote address (20 minutes)

Mr. Jim Makris, Emergency Coordinator, United States Environmental Protection Agency, United States of America.

This presentation will provide an overview of the problems of Na-Techs with reference to the experience of the United States of America in managing the aftermath of Hurricane "Andrew", the mid-west floods and the Northridge earthquake.

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Speaker 2: Cause and effect (15 minutes)

Dr. Evgenii Dmitriev, Director, Institute of Applied Ecology, Russian Ministry of the Environment and Natural Resources Protection.

This presentation will detail the Russian experience of managing Na-Techs, with particular reference to the problems of flooding in the Caspian Sea region.

Speaker 3: Cause and effect (15 minutes)

Mr. Hideaki Oda, Japanese Ministry of Construction.

This presentation will outline the Japanese approach to flood prevention in urban areas where the consequences of a Na-Tech disaster would be particularly profound.

Audience discussion (15 minutes)

Speaker 4: Management issues (15 minutes)

Dr. Channaronk Chandrachoti, National Economic and Social Development Board, Thailand.

This presentation will examine the problems facing a rapidly industrializing country such as Thailand, and identify lessons that can be applied to other countries which face similar problems of increasing urbanization, a growing demand for industrial development and regions prone to natural disasters.

Speaker 5: Management issues (15 minutes)

Mr. Alain Clerc, Coordinator, Centre for Urgent Environmental Assistance, United Nations Environment Programme.

This presentation will highlight the need to consider the environmental impacts of Na-Techs and will also examine the process whereby industrial impacts from pollution can aggravate natural disaster events such as storms and floods.

Audience discussion (15 minutes)

Speaker 6: Planning and response (10 minutes)

Dr. Claudio Margottini, ENEA, Italy.

This presentation will introduce the next two speakers in trying to tie together the lessons of cause and effect into practical planning and response options for countries facing Na-Techs.

Speaker 7: Planning and response (15 minutes)

Professor Julio Kuroiwa, National University of Engineering, Peru.

This paper will present an integrated approach to natural and technological multi-hazard disaster reduction by the use of integrated planning and microzonation.

Speaker 8: Planning and response (15 minutes)

Professor Enrico Quarantelli, Disaster Research Center, University of Delaware, United States of America

The final paper provides the future outlook for Na-Techs and notes that such events are likely to increase in both frequency and magnitude. Policy options for managing such trends are put forward, placing the session's discussions into a forward-looking context for future action.

Audience discussion (15 minutes)

Summary of the discussion

Mr. Edward Bennett, Director of the Nuclear Safety, Industry and Environment and Civil Protection division of DGXI of the European Union will make a concluding statement.

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Technical session

Addendum

INTERRELATIONSHIPS BETWEEN TECHNOLOGICAL AND NATURAL HAZARDS

Summary of presentation by Mr. Jim Makris, Director,
Chemical Emergency Preparedness and Prevention Office
United States Environmental Protection Agency,
United States of America

1. The interrelationships between natural and technological hazards and disasters do not receive enough attention. In the past few years, a large part of the workload of my office has been generated by major natural disasters. As we enter the next decade and the next century, it is essential to think about and plan to deal with the combined natural and technological disasters.

2. Major natural disasters often produce technological hazards and negative environmental impacts. In the United States of America three recent, major natural disasters - hurricane "Andrew" in Florida (1992), the Mid-West floods of 1993, and the Northridge (California) earthquake of 1994 - have highlighted the increasing interrelationships between natural and man-made

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disasters. Further, these recent events caused environmental impacts and technological hazards that were greater in number and importance than had been experienced before. Such impacts made both the response and recovery activities to major natural disasters more complex and protracted.

3. In general, almost every natural disaster is accompanied by some sort of technological disaster that has the potential to significantly aggravate the response. To date, the United States of America has been fortunate in that it has yet to be the victim of a natural disaster creating a catastrophic technology calamity; however, low-impact events are common. The prospect for great danger remains, partly because preparations that recognize the complications inherent in such combined events typically are not adequate.

4. Many of the United States experiences are typical of what has been observed throughout the world, according to a recent report of the United Nations Environment Programme (UNEP) on two decades of environmental challenges. Several researchers have acknowledged that the ever-increasing industrialization of the world, as well as the quickening pace of urbanization, will add to the quantitative increase and qualitatively worsening of disasters of the coming century. Another contributor to environmental hazards in the future is chemical hazards. Even localities in the past which had few or no risks from natural disasters are now vulnerable if they have any roads or navigable waterways in the vicinity of toxic chemical accidents or emergencies. In short almost any inhabited areas of society are now vulnerable to disasters from hazardous chemicals even when there are no manufacturing, storage or use facilities in the vicinity. While not all developed societies or communities are subject to major natural hazard threats from within, almost all are now increasingly subject to risk as dangerous chemicals in growing numbers are moved around more frequently.

5. In the near future, the world probably will face more and worse disasters as a consequence of increased technological dependence, urbanization and social complexity. Nevertheless, some positive international efforts are being made and new organizations formed to deal with risk assessment and management, such as those undertaken by the Organisation for Economic Cooperation and Development and by UNEP, one product of which is the programme known as APELL (Awareness and Preparedness for Emergencies at the Local Level). Since industrialization and urbanization will continue, the only questions are about how those processes can be modified or channelled to reduce the current negative effects. Some suggestions are offered to Governments of developing countries.

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NATURAL DISASTER REDUCTION: INTERRELATIONSHIPS BETWEEN TECHNOLOGICAL AND NATURAL HAZARDS

Technical session

Interrelationships between natural and man-made risks: the Russian experience

Summary of presentation by Dr. Evgenii S. Dmitriev, State Institute for Applied Ecology, Russian Ministry of the Environment and Natural Resources Protection; and Mr. Viktor A. Vladimirov, Russian Ministry on Civil Defence, Emergencies and Liquidation of Natural Disaster Consequences

1. The presentation gives a statistical analysis of the emergencies of natural and man-made character with environmental effects that took place on the territory of the Russian Federation in 1992-1993. It shows that for Russia the possibility exists of increasing negative effects of natural disasters in their interrelationship with man-made emergencies.

2. This problem is especially aggravated by water resources pollution and accidents on pipelines. The report produces a matrix of cause and effect relationships for various natural events and man-made catastrophes with environmental effects. The matrix is built with due regard given to existing

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potentially hazardous objects and is peculiar to Russian natural hazard phenomena. On the basis of this matrix, a concrete situation is analysed, conditioned by the level lift of the Caspian Sea, flood occurrence and destruction of hazardous industrial waste disposal sites. For the discussed situation the report gives information concerning measures on emergency prevention, both implemented and planned. Planning of future activities with due regard given to interrelationships between natural and man-made risks is considered as one such preventive measure. General requirements for future activity planning are formulated, and normative and legislative acts, on the base of which such requirements should be met, are described.

3. The information cited in the report will be certified by official statistic data, data and information from the State of the Environment Reports of the Russian Federation.

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Technical session

Addendum

Urbanization and flood control methodology in Japan

Summary of presentation by Mr. Hideaki Oda, Ministry of Construction, Japan

1. From the 1960s to around 1978, the year of the first oil shock, Japan experienced a high economic growth rarely seen in world history, with a remarkable development of heavy chemical and machine industries. This extraordinary economic growth forced rapid urbanization which resulted in dense concentrations of population and assets in urban areas, particularly in three major metropolitan areas. As a result, approximately 50 per cent of the population and 75 per cent of the assets are located within the latent flooding areas of rivers as of 1985. Yet, as cities develop onto the flood plain, Japan is faced with high technology facilities such as chemical plants in an area which, if inundated, would cause enormous humanitarian, economic and environmental damage.

2. The problems caused by such rapid and dense urbanization are as follows:

(a) If a levee is breached in the major metropolitan areas, such as Tokyo and Osaka which have a dense concentration of population, assets and central management functions, it would cause terrible flooding and many lives and assets would be lost, resulting in incredible social and economic confusion. A large-scale inundation would cripple the urban heart of Japan with paralysis of transport systems, outage of on-line financial and banking systems and disruption to essential services such as water supply and

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sewerage. Parks and greens in the urban area would be spoiled by the flooding. The flooding would have a serious effect on the urban environment; health and culture would suffer. Recovery from flood damage would be over the long term. Such an issue is also valid for many rapidly developing cities around the world which find the flat flood plain areas ideal for development. They could learn from the lessons of Tokyo and Osaka and help prevent, prepare for and be able to respond to emergencies when they arise;

(b) Because of rapid urbanization, basins are almost covered with surfaces such as concrete and asphalt which do not allow water infiltration. Through the resulting lost water retention and retardation functions in basins, peak flow discharge is increased and time of flood concentration decreased; inundation has frequently occurred and greatly influenced urban activities. In addition, as previously undeveloped areas along river flood plains become valuable property for rapid expansion, it is often difficult to purchase the areas for river improvement projects. As a result, small-scale inundation becomes more frequent.

3. Japan has opted to prevent large-scale flooding by the use of super-levees, that is, high standard embankments that can contain the flood water. They are designed to a high standard sufficient to retain their protective qualities even during long-term flooding above the normal water levels. At present, they are constructed in six rivers in Tokyo and Osaka.

4. This is just part of an overall strategy to tackle rapid urbanization and flooding potential. Other complementary policies are also used, for example, the promotion of river improvement, monitoring run-off, a comprehensive warning and evacuation system, as well as public information policies to ensure that citizens at risk are aware of the areas likely to be affected by any breach.

5. While such construction projects are expensive, they are an important investment against catastrophe. Lessons from the Japanese experience would be relevant to any rapidly developing city on every continent. Japan experienced rapid growth years ago and has had the time to develop effective strategies. It is important that other countries, without the economic strength of Japan, use these lessons in planning and protection to mitigate the risk of disaster.

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NATURAL DISASTER REDUCTION: INTERRELATIONSHIPS BETWEEN TECHNOLOGICAL AND NATURAL HAZARDS

Technical session

Problems facing a rapidly industrializing country in planning and response for disasters

Summary of presentation by Dr. Channaronk Chandrachoti, National Economic and Social Development Board, Thailand

1. During the past 20 years, the place of development, industrialization and urbanization in Thailand has been dramatic. There are now major industrial development projects in almost every province. Bangkok is an incipient mega-city. Unfortunately, the price paid in this rush for growth has been that profit has sometimes been put before safety of the environment. The effects are to be seen in increased air and water pollution, deforestation, soil erosion, illegal issuance of land titles, illegal and legal factories that violate environmental protection laws, environmental problems relating to mining, and weather and climatic changes due to deforestation and destruction of watersheds. There has also been a marked change in the pattern of disasters, from the occasional cyclone or drought or floods of manageable proportions to serious droughts and floods with associated landslides, and more recently a disturbing number of technological disasters, structural failures and transportation accidents. Vulnerabilities have increased and, as always, it is the underprivileged who are suffering the most.

2. The problems which now confront the country can be attributed to several causes: outdated legislation and codes; a national organizational structure for disaster management which is still relief oriented; poor inter-departmental liaison; jealously guarded interests and power; overlap of

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responsibilities; insufficient and poorly trained staff; less than optimal utilization of resources; and a widespread lack of understanding of the causes and effects of disasters. Enforcement of regulations is usually reactive.

3. Looking ahead, if improvements are to succeed in Thailand they must be appropriate to the culture. Thailand is not a society of law but of relationships and patronage. We need therefore to develop a culture of greater social responsibility and self-regulation. Social sanctions must be developed and incentives devised. A culture of compliance will be more successful than enforcement dependent upon inadequate resources. Investors must be persuaded to include disaster mitigation measures in investment costs. In this process, the responsible private sector is helping to set an example. Thailand needs a more integrated, multi-sectoral, approach to disaster management, set in a developmental context. Revisions to laws and organizational structures are necessary. A model disaster action plan has been developed for Thailand's biggest industrial estate at Rayong, and the National Economic and Social Development Board will soon publish a journal on the theme "Disaster and National Development" as an awareness-raising exercise at the highest levels.

4. In a rapidly industrializing country such as Thailand, it is impractical to consider "natural" and "technological" disasters as entirely separate issues.